

Spot Safety Project Evaluation

Project Log # 200505130

Spot Safety Project # 06-96-204

Spot Safety Project Evaluation of the Rumble Strips Installation along the Inside and the Outside Paved Shoulders of I 95 in Harnett County from Johnston County Line to Cumberland County Line, I 95 in Cumberland County from Harnett County Line to SR 1005 and I 95 in Robeson County from Cumberland County Line to US 301 / SR 1997.

Documents Prepared By:

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Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-96-204 – The Rumble Strips installation along the inside and the outside paved shoulders of I 95 in Harnett County from Johnston County Line to Cumberland County Line, I 95 in Cumberland County from Harnett County Line to SR 1005 and I 95 in Robeson County from Cumberland County Line to US 301 / SR 1997.

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naïve before and after analysis has been completed to measure the effectiveness of the spot safety improvement. Additional analysis methods were not utilized for this evaluation because a suitable comparison group was unattainable. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of rumble strips along both the inside and the outside paved shoulders of I 95 in Harnett, Cumberland and Robeson counties. I 95 is a four lane, fully controlled access facility, with a ten foot outside paved shoulder, a four foot inside paved shoulder and a variable width median. Milled rumble strips were chosen for this project with a 16 inch width located 6 inch off the edge line.

The initial crash analysis was completed from January 1, 1993 through December 31, 1994. In the two year period a total of 58 Ran Off Road type crashes were reported in Harnett county, a total of 60 Ran Off Road type crashes were reported in Cumberland county and a total of 280 Ran Off Road type crashes were reported in Robeson county. There were 12 Fatal injuries, 55 class A injuries, 116 class B injuries and 187 class C injuries resulting from these crashes. The statement of the problem was drivers inattention and falling asleep have contributed to a large number of Ran Off Road type crashes along I 95 in Harnett, Cumberland and Robeson counties. The final completion date for the improvement at the subject location was on November 26, 1997 with a total cost of \$60,000.00.

Naïve Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from January 1, 1997 through December 31, 1997. The before period consisted of reported crashes from January 1, 1990 through December 31, 1996 (7 Years) and the after period consisted of reported

crashes from January 1, 1998 through December 31, 2004 (7 Years). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes on I 95 from MP 0.0 to MP 8.84 in Harnett county, I 95 from MP 21.03 to MP 30.55 in Cumberland county and I 95 from MP 21.62 to MP 38.79 in Robeson county. A 0 feet Y-line was used in this analysis. *Please see attached Location Map and Photos for further detail.*

The following data tables depict the naive before and after analysis for the Total crashes and the Target crashes at the treatment location. Please note that the rumble strips installation Target crashes include the following crash types: Ran Off Road - Right, Ran Off Road - Left, Ran Off Road - Straight, Overturn/Rollover, Fixed Object, Head On, Sideswipe - Same Direction, and Sideswipe - Opposite Direction. Target crashes are all potential Ran-Off Road crashes and include those crash types where at least one vehicle was involved in a lane departure.

<u>Crash Data Summary</u>	Before	After	Percent Reduction (-) / Percent Increase (+)
Harnett County:			
Total Crashes	353	590	67.1
Total Severity Index	9.83	6.06	-38.4
Target Crashes	212	350	65.1
NB - Target Crashes	103	151	46.6
SB - Target Crashes	109	199	82.6
Volume	35100	44600	27.1
Cumberland County:			
Total Crashes	355	593	67.0
Total Severity Index	10.45	7.16	-31.5
Target Crashes	224	366	63.4
NB - Target Crashes	102	161	57.8
SB - Target Crashes	122	205	68.0
Volume	34800	42000	20.7
Robeson County:			
Total Crashes	827	1151	39.2
Total Severity Index	9.6	5.78	-39.8
Target Crashes	535	703	31.4
NB - Target Crashes	228	333	46.1
SB - Target Crashes	307	370	20.5
Volume	35000	39000	11.4

Target Crashes Data Summary	Before	After	Percent Reduction (-) / Percent Increase (+)
Harnett County:			
Total Target Crashes	212	350	65.1
Target Crashes Severity Index	11.41	5.87	-48.7
Ran Off Road Type Crashes	157	142	-9.6
Fixed Object Type Crashes	8	89	1012.5
Overturn / Rollover	5	10	100.0
Head On	0	1	N/A
Sideswipe, Same Direction	41	106	158.5
Sideswipe, Opposite Direction	0	1	N/A
Unknown	1	1	0.0
Cumberland County:			
Total Target Crashes	224	366	63.4
Target Crashes Severity Index	13.14	7.69	-41.5
Ran Off Road Type Crashes	181	79	-56.4
Fixed Object Type Crashes	5	189	3680.0
Overturn / Rollover	8	20	150.0
Head On	0	1	N/A
Sideswipe, Same Direction	28	76	171.4
Sideswipe, Opposite Direction	0	1	N/A
Unknown	2	0	-100.0
Robeson County:			
Total Target Crashes	535	703	31.4
Target Crashes Severity Index	10.48	6.07	-42.1
Ran Off Road Type Crashes	412	144	-65.0
Fixed Object Type Crashes	29	352	1113.8
Overturn / Rollover	10	42	320.0
Head On	2	2	0.0
Sideswipe, Same Direction	81	162	100.0
Sideswipe, Opposite Direction	0	1	N/A
Unknown	1	0	-100.0

The naive before and after analysis at the treatment location resulted in the following: For Harnett County there was a 67.1 increase in Total crashes, a 38.4 percent decrease in the Total Severity Index, a 65.1 increase in Target crashes, a 48.7 decrease in Target Crashes Severity Index and a 27.1 percent increase in Average Daily Traffic (ADT). For Cumberland County There was a 67.0 increase in Total crashes, a 31.5 percent decrease in the Total Severity Index, a 63.4 increase in Target crashes, a 41.5 decrease in Target Crashes Severity Index and a 20.7 percent increase in Average Daily Traffic (ADT). For Robeson County there was a 39.2 increase in Total crashes, a 39.8 percent decrease in the Total Severity Index, a 31.4 increase in Target crashes, a 42.1 decrease in Target Crashes Severity Index and an 11.4 percent increase in Average Daily Traffic (ADT). The before period ADT year was 1993 and the after period ADT year was 2001.

Additional in-depth analysis for the Target crashes resulted in the following: For Harnett County there was a 46.6 increase in Northbound crashes, an 82.6 increase in Southbound crashes, a 9.6 decrease in Ran Off Road crashes and a 1012.5 increase in Fixed Object crashes. For Cumberland County there was a 57.8 increase in Northbound crashes, a 68.0 increase in Southbound crashes, a

56.4 decrease in Ran Off Road crashes and a 3680.0 increase in Fixed Object crashes. For Robeson County there was a 46.1 increase in Northbound crashes, a 20.5 increase in Southbound crashes, a 65.0 decrease in Ran Off Road crashes and a 1113.8 increase in Fixed Object crashes.

Results and Discussion

The naive before and after analysis involving the comparison of the treatment actual before data versus the treatment actual after data resulted in an increase in both Total and Target crashes, a decrease in both Total and Target Severity Indexes, a decrease in Ran Off Road type crashes and an increase in Fixed Object type crashes from the before to the after period.

As shown above the Fixed Object type crashes has increased significantly from the before to the after period and this may be attributed to the state median barrier and guardrail project in which median barriers were installed along large sections of interstates and highway facilities. The actual effect of rumble strips is hard to measure cause it is not possible to consider for the unreported Ran Off Road movements which were corrected back in the driving lanes after motorists drove on the rumble strips. As shown in the statistics a general measure of effectiveness for the rumble strips installation was looking at the Ran Off Road crashes along with the Severity Index and as a result both measures were reduced from the before to the after period and this may be attributed to the rumble strips installation.

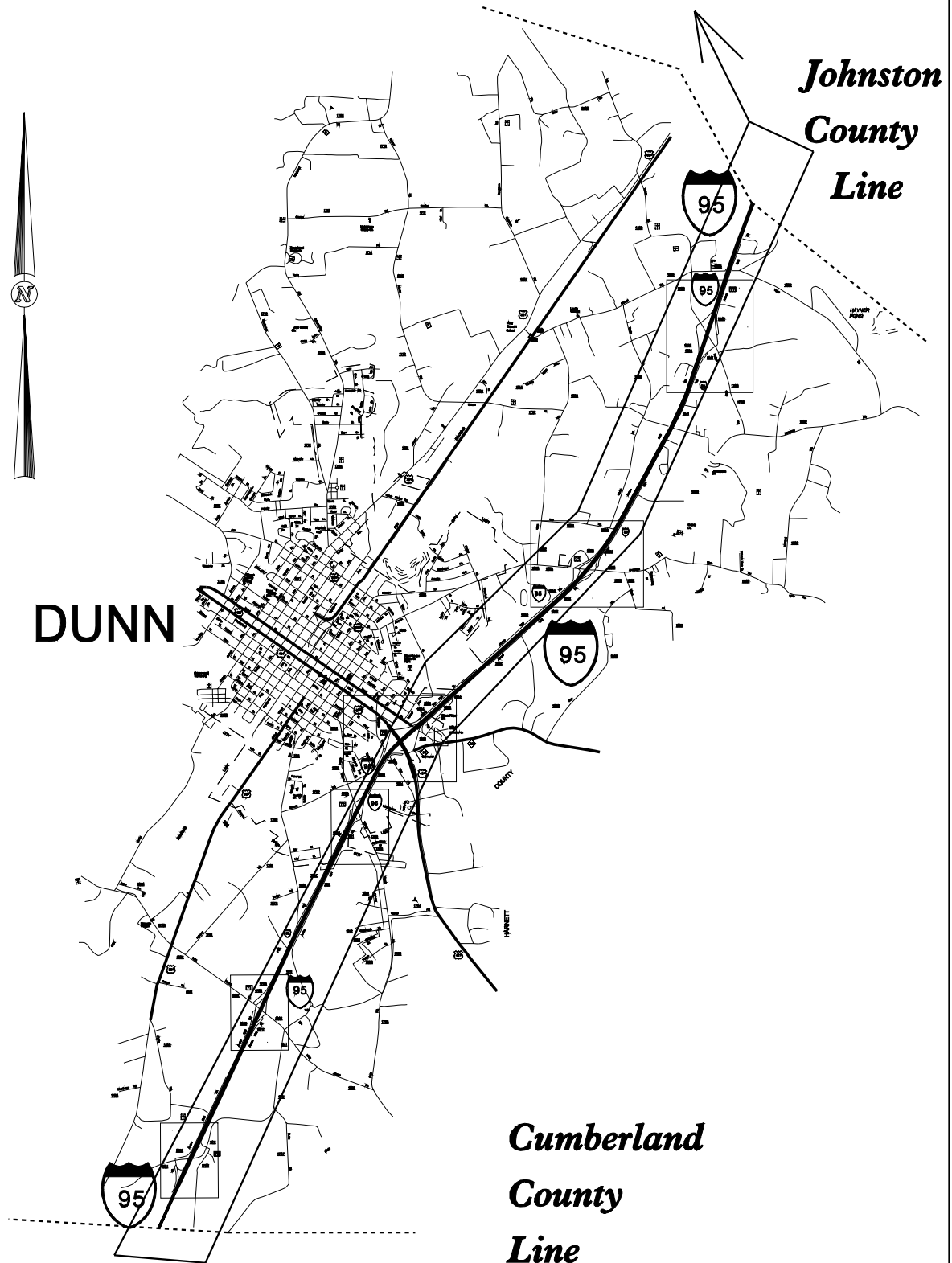
Note that the type of rumble strips installed in this project were 16 inch wide milled rumble strips with a 6 inch offset from the edge line along both the inside and the outside paved shoulders of I 95. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of improvements.

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Location Map, Harnett County

Treatment Site:

I 95 From Johnston County Line to Cumberland County Line

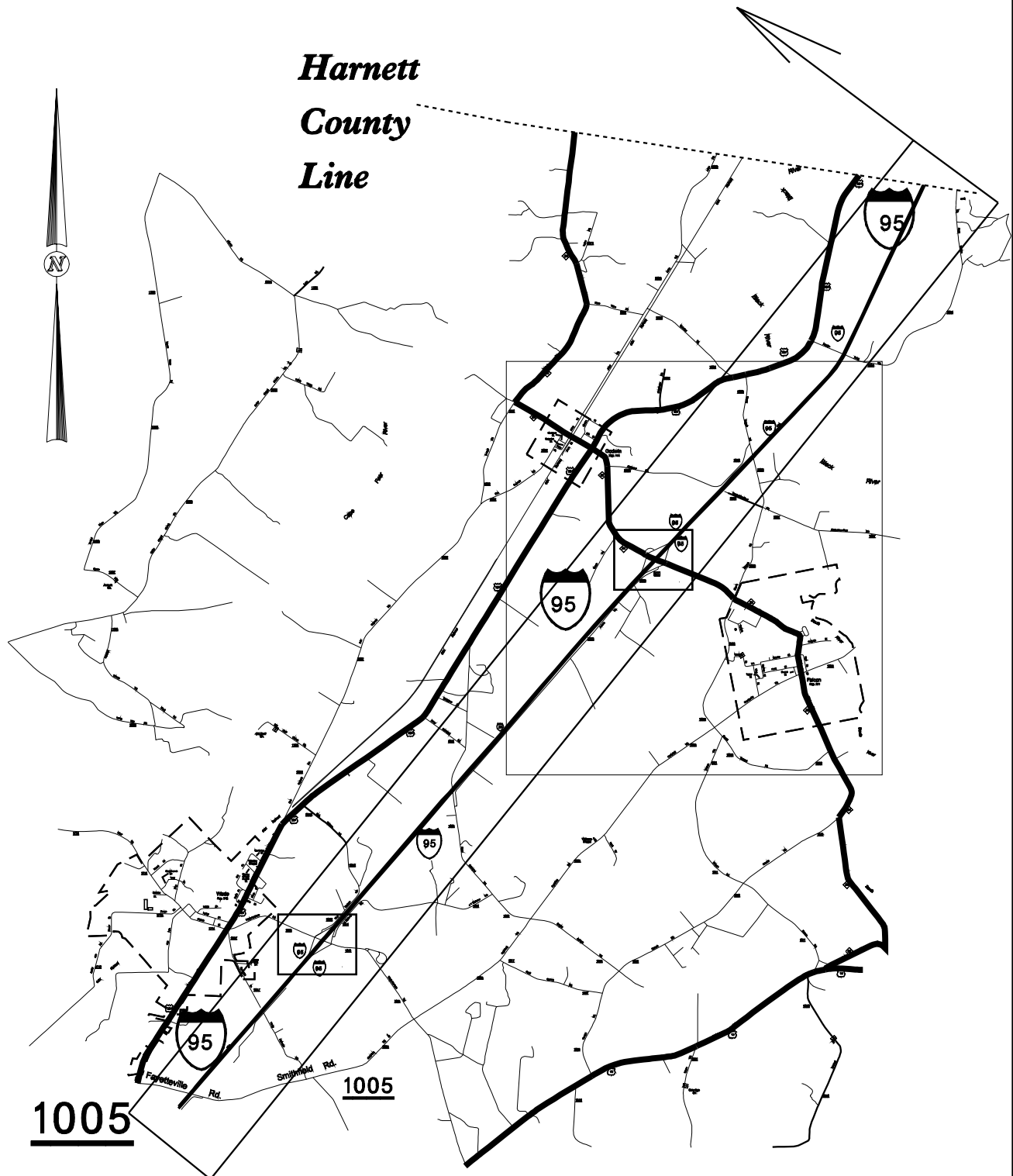


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Location Map, Cumberland County

Treatment Site:

I 95 From Harnett County Line to SR 1005

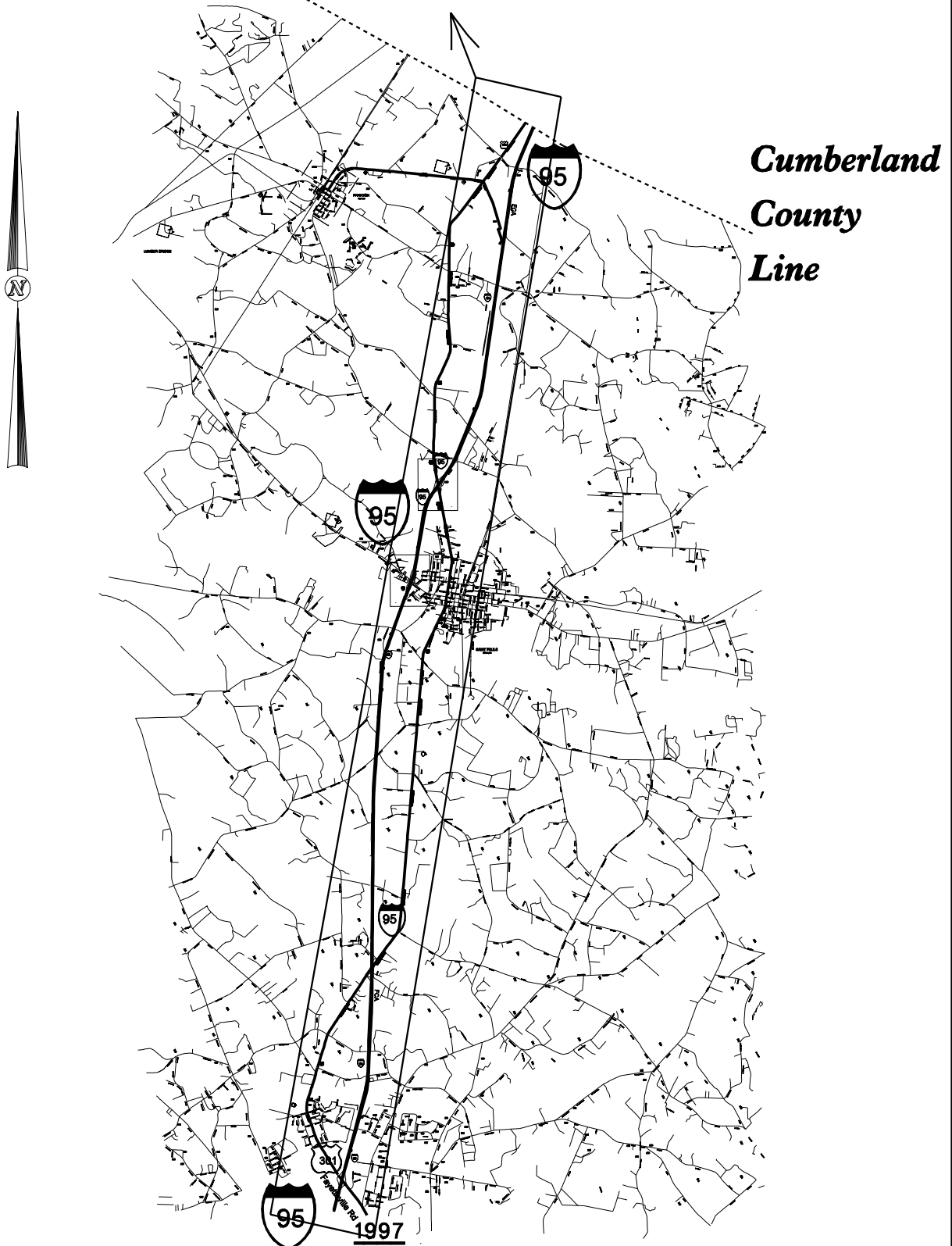


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Location Map, Robeson County

Treatment Site:

I 95 From Cumberland County Line to SR 1997 /US 301



Treatment Site Photos Taken on December 6, 2005



I 95 Northbound near MM 29 – Robeson County





I 95 Northbound near MM 29 – Robeson County



I 95 Northbound near MM 29 – Robeson County



I 95 Northbound near MM 29 – Robeson County



I 95 Northbound near MM 29 – Robeson County



I 95 Northbound near MM 65 – Cumberland County



I 95 Northbound near MM 65 – Cumberland County